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Notice of Allowability

Application No.

10/722,237

Examiner

Evelyn A. Lester

Applicant(s)

ALLEN ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-29.
3. ☒ The drawings filed on 24 November 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 11-24-03
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.


EVELYN LESTER
PRIMARY EXAMINER

REASONS FOR ALLOWANCE

1. The following is an examiner's statement of reasons for allowance:

The prior art does not show or fairly suggest the claimed invention of a microelectromechanical apparatus for redirecting incident light having all the claimed structure and all the claimed limitations, wherein a rejection under 35 USC 102 or 103 would be improper. Please particularly note the combination of claimed elements and claimed limitations, including as recited in the independent, such as claim 1, the claimed invention having a substrate, a first electrostatic actuator formed on the substrate and comprising a first beam supported above the substrate for movement towards the substrate in response to a first actuation voltage provided to the first electrostatic actuator, a second electrostatic actuator comprising a second beam formed above the first electrostatic actuator and attached thereto, with the second beam being moveable towards the substrate in response to movement of the first beam, and with the second electrostatic actuator providing a further movement of the second beam towards the substrate in response to a second actuation voltage provided to the second electrostatic actuator, and a plate formed above the second electrostatic actuator and attached thereto, with the plate having a surface for reflecting the incident light to generate a reflected light component having a phase shift or a change in an angle of propagation which depends upon a movement of the plate produced by one or both of the first and second electrostatic actuators; such as the invention recited in claim 15, a substrate, a plate supported above the substrate and having a light-reflecting upper surface, and a plurality of interconnected beams located beneath the plate to

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support the plate and to electrostatically move the plate towards the substrate, with the plurality of interconnected beams comprising three beams formed substantially parallel to the substrate, and with the three beams including a pair of beams formed from one or two layers of polycrystalline silicon and another beam formed from a different layer of polycrystalline silicon, and with each beam having at least one electrode located beneath the beam to urge the beam towards the substrate in response to an actuation voltage provided between the electrode and the beam to move the plate towards the substrate; such as the invention recited in claim 20, a substrate, a plate supported above the substrate and having a light-reflecting upper surface, and a pair of electrostatic actuators formed above the substrate to support the plate for movement thereof, with the pair of electrostatic actuators comprising:

- (1) a first electrostatic actuator further comprising a pair of spaced-apart beams with each beam being connected at one or both ends thereof to the substrate, and with a first electrode being formed beneath each beam to urge the plate towards the substrate in response to an electrostatic force of attraction produced between that beam and the first electrode therebeneath, and
- (2) a second electrostatic actuator comprising another beam located above the pair of spaced-apart beams of the first electrostatic actuator and connected thereto and further being connected to the plate, and a pair of second electrodes formed beneath the beam of the second electrostatic actuator to further urge the plate towards the substrate in response another electrostatic force of attraction produced between that beam and at least one of the pair of

second electrodes; and the invention recited in claim 25, a substrate, a plate supported above the substrate and having a light-reflecting upper surface, and a pair of electrostatic actuators attached to the substrate by a single support post to electrostatically move the plate towards the substrate, with the pair of electrostatic actuators comprising:

- (1) a first electrostatic actuator further comprising a beam attached to the single support post near a midpoint of the beam, and with a pair of first electrodes being formed beneath the beam proximate to the single support post to urge the plate towards the substrate in response to an electrostatic force of attraction produced between the beam and at least one of the first electrodes located therebeneath, and
- (2) a second electrostatic actuator further comprising a pair of beams located above the beam of the first electrostatic actuator and attached thereto at one end of each of the pair of beams, with another end of each of the pair of beams being attached to the plate, and with a second electrode being formed beneath each of the pair of beams proximate to the beam of the first electrostatic actuator to further urge the plate towards the substrate in response to another electrostatic force of attraction produced between at least one beam of the pair of beams and the second electrode located therebeneath.

The particular feature, which was found to be novel was the beam structure of each claimed invention and their relationship to the electrostatic actuators, the plate and

the substrate. The claimed beam arrangement provides for an increased range of vertical movement for controlling a phase shift or tilt angle of the reflected light.

The closest prior art considered by the Examiner was a U.S. Patent to Michalicek et al, Patent Number 6,028,689, wherein it nearly reads on claim 15. However, the prior art fails to provide "another beam formed from a different layer of polycrystalline silicon." This is similar to the other claimed inventions in that not all of the beams recited are located in the same plane. Michalicek et al only teach beams in the same plane, and therefore do provide for the claimed limitations of the claimed invention.

Therefore, the claimed invention is considered to be in condition for allowance as being novel and nonobvious over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 11-24-04 was filed before the mailing date of this office action. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following are U.S. Patents which are directed to various configurations of microelectromechanical apparatuses:

Fleming	U.S. Patent 5,867,302
Mei et al	U.S. Patent 6,433,917 B1
Mei et al	U.S. Patent 6,512,625 B2
Weaver et al	U.S. Patent 6,708,491 B1
Sniegowski et al	U.S. Patent 6,808,952 B1
Mei et al	U.S. Patent Pub. US 2002/0149834 A1


5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evelyn A. Lester whose telephone number is (571) 272-2332. The examiner can normally be reached on M- F, from about 10 am to 7 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached on (571) 272-2328. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Evelyn A. Lester
Primary Examiner
Art Unit 2873

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July 7, 2005